SECTION 1 - PROPOSED PROJECT

1.1 Description and Purpose of and Need for the Proposed Project

1.1.1 Description

The M-85 structure over the Rouge River is a double-leaf Chicago Style bascule bridge (drawbridge). The structure is commonly referred to as the Fort Street Bridge and will be referred to as such throughout the remainder of this document. Built in 1922, the bridge is considered historically significant and is protected by Section 4(f) of the Department of Transportation Act. Further discussion of the bridge's historic nature is given in *Section 3 – Section 4(f) Evaluation*. The bridge carries five lanes of traffic and two eight-foot sidewalks over the Rouge River in Detroit between Dix Avenue and I-75. (See Exhibit 1 for the project location). The total length of the structure is approximately 278 feet, measured from the centerline of bearing at abutment A to the centerline of bearing at abutment B. The roadway is 56 feet wide between curbs and has an overall width of 74 feet. Each bascule pier is 80 feet long and 95 feet wide and houses the motors, pinion gears, and racks used to lift the leaves to allow water craft to pass through the shipping channel. The existing horizontal clearance (distance between fenders) of the channel is 118 feet.

Each movable leaf measures 82 feet from trunnion (horizontal pivot point) to toe (end of the bascule leaf). Stationary spans over the bascule piers measure approximately 35 feet long, and each approach span is 29 feet long. The roadway deck of the bascule portion of the bridge is an open grid steel deck, flanked by steel grid sidewalks. The trunnion and approach spans carry concrete roadway decks, while the roadway approaches are paved with asphalt. The two abutments are reinforced concrete supported on timber piles. The piles are arranged as to miss the two brick utility tunnels beneath the bridge.

The bridge originally had two operator houses. However, the operator's house at the southwest corner was removed during a previous rehabilitation. The streetcar tracks, decorative approach, and original bridge railings have also been removed. The remaining octagon-shaped operator's house, at the northeast corner of the bridge, is visible in Photographs 1 and 2 of Appendix A. An operator opens the bridge an average of six to eight times per day. Although most openings are of short duration, about 10 percent may last 15 minutes or more.

Based on 2001 and 2002 traffic data, the average daily traffic (ADT) on the existing bridge is 13,000 vehicles. Commercial traffic varies between 8 to 17 percent on Fort Street at the Miller Street intersection and between 5 to 11 percent on Fort Street at Oakwood Boulevard. Oakwood Boulevard carries about 3 to 9 percent commercial traffic during peak hours. The 2025 ADT is expected to be approximately 15,000 vehicles with approximately the same percentage of commercial traffic. The intersections at both ends of the bridge operate at Level of Service (LOS) B or above and are expected to operate at the same level in the future. According to 2001 AASHTO, LOS D or above is acceptable.

1.1.2 Purpose of and Need for the Proposed Project

The primary purpose of the proposed project is to correct deficiencies of the bascule bridge so traffic flow on Fort Street (M-85) over the Rouge River, as well as boat traffic within the river channel, can be maintained. The secondary purpose is to establish a traffic flow preference for M-85.

The need to rehabilitate or replace the bridge is driven by its deteriorating condition. Specific bridge deficiencies include inward pier migration, structural deterioration, inadequacies in the electrical and mechanical systems, a substandard fender system, and a horizontal clearance that does not meet current U.S. Coast Guard standards. Although extensive repairs have been made to the bridge over the years, replacement or a major rehabilitation is imminent. In addition to correcting deficiencies associated with the bridge, there is also a need to improve the current alignment of the Fort Street/Oakwood Boulevard intersection to better define M-85 as the through route.

1.1.3 Bridge Deficiencies

***Pier migration*.** Previous investigations have documented that the bascule piers have moved together almost six inches over the life of the structure, interfering with the opening and closing of the bascule leaves. Several maintenance procedures have been employed to alleviate problems associated with the inward migration of the piers. In 1964, an automatic sprinkler system was installed to cool off the ends of the bridge so the leaves would close properly in warm weather. In 1978, MDOT rebuilt the ends of the bascule leaves, shortening them so as not to impede bridge operations. The future stability of the piers is in question. Cracks in the brickwork and concrete are visible in the machinery rooms of the bascule piers.

Structural deterioration. According to the most recent Bridge Safety Inspection, conducted in October 2003, the Fort Street bridge superstructure is generally in fair to poor condition. (Refer to Appendix B for a copy of the report.) All the built-up members have active corrosion in the seams between back-to-back angles at the members' lacing bars and batten plates. Corrosion and pack rusting are generally worse at the inboard bascule trusses. The floor beams on the bascule span are trussed type members and are generally in poor condition. Active corrosion and section loss have typically developed at the top flange connection to the inboard bascule trusses; in many cases corrosion has caused holes in the connecting material reducing the capacity of the connection. The floor beams also have section loss on the outstanding legs of the top and bottom flange angles. The open grid roadway deck on the bascule span, installed in 1978, is in fair to poor condition. There are several areas where there are bent or missing grating bars. Photographs 3 and 4 in Appendix A illustrate structural deterioration documented during the bridge's structural system inspection in 1998.

Horizontal clearance. According to navigational charts, the distance between fenders is 118 feet. The U.S. Coast Guard has stated that a horizontal clearance of less than 135 feet is not conducive to maintaining safety to the bridge and transiting vessels, nor could a lesser clearance be established to meet the needs of future navigation on the Rouge River.

Electrical system inadequacies. In general, the electrical equipment is operational and well-maintained. However, many of the components are from the 1970s or earlier and are of obsolete manufacture. There are no in-sight disconnect switches for the main span motors and center lock motor, which is a National Electric Code violation. Limit switches are not provided on the motor and machinery brakes, which is in violation of American Association of State Highway and Transportation Officials (AASHTO) standards. Results of insulation resistance to ground tests performed on motors and feeders indicated deterioration and the possibility for a failure.

Mechanical system inadequacies. The mechanical components of the bridge are in satisfactory condition, but they show their age with respect to wear and design. The gears and bearings show considerable wear but appear to be well-aligned. The span locks are worn to the point of being out of tolerance. The mechanical components of the bridge would not meet current AASHTO requirements. Long term use of the bridge would require complete mechanical rehabilitation.

Substandard fender system. The fender system, necessary to protect the piers from accidental collision with freighters traveling the Rouge River, is in fair condition. Repairs to the fender system were completed in 2001 and were intended to extend the serviceable life of the bridge by about ten years. The existing fender system is minimal, deteriorating, and does not meet current AASHTO guidelines. The fender system is visible in Photographs 1, 5, and 6 of Appendix A.

1.1.4 Traffic Flow Preference for M-85

Fort Street/Oakwood Boulevard intersection. The alignment of the roads at the west end of the bridge does not provide for the most efficient flow of traffic, especially southbound on M-85. Of the five lanes on the bridge, two are for northbound traffic and three are for southbound traffic. Traffic in the rightmost southbound lane must continue west on Oakwood Boulevard. Traffic in the leftmost and center lanes must make a left turn at the intersection and continue south on Fort Street. Realignment of the roads at the west end of the bridge would better define M-85 as the through route. See Exhibit 2 and Photograph 6 in Appendix A for a view of the existing intersection.

1.2 Alternatives

1.2.1 No Action Alternative

The no-action alternative involves taking no action to rehabilitate or replace the existing structure, other than routine maintenance. Routine maintenance would not correct all of the deficiencies that may cause structural failure which could eventually lead to the permanent closure of the bridge. Therefore, this alternative is not recommended but is used as a benchmark for analyzing the other alternatives.

1.2.2 Replacement on Existing Alignment (Alternative A)

Alternative A, shown in Exhibit 2, would involve constructing a new bascule bridge over the Rouge River using the existing alignment. One advantage of Alternative A is that very minimal or no additional right-of-way would be required. To satisfy U.S. Coast Guard requirements, the

horizontal clearance of the new bridge would need to be increased from 118 feet to at least 135 feet. The new bridge would have five twelve-foot lanes with eight-foot sidewalks on both sides. Barriers would separate bridge traffic from pedestrians and bicyclists and improve safety. Exhibit 3 shows a typical cross section of the proposed structure.

Constructing a new bascule bridge on the existing alignment would result in a shorter bridge span and cost less than building on a new alignment. However, the savings would likely be offset by the additional costs to adjust abutment footings to avoid the existing caissons and the existing brick utility tunnel underlying the bascule piers and abutment footings. Compared to Alternative B, more utility coordination would be necessary to construct on the existing alignment. A bridge closure and detour of up to two years will be required for vehicular traffic. See *Section 2.5 – Maintaining Traffic*, for further details about the proposed detour. Boat traffic in the channel will be maintained during construction.

Replacing the bridge on its existing alignment would address U.S. Coast Guard standards but it would not improve the Fort Street/Oakwood Boulevard intersection nor would it provide an opportunity to retain the operator's house. Therefore, Alternative A is not considered feasible.

1.2.3 Preferred Alternative - Replacement on a 13° Skewed Alignment (Alternative B)

Alternative B, shown in Exhibit 4, is the preferred alternative. This alternative would involve constructing a bascule bridge with a new alignment to improve the Fort Street/Oakwood Boulevard intersection. This alternative would favor Fort Street making it the primary movement. To satisfy U.S. Coast Guard requirements, the horizontal clearance of the new bridge would need to be increased from 118 feet to at least 135 feet. The lanes and sidewalks would have the same dimensions as described in Alternative A and illustrated in *Exhibit 3 – Proposed Cross Section*. Building on a new alignment may also allow for the retention of the operator's house, thereby providing an opportunity for mitigating the historic aspect of the existing bridge. Measures to record the historic nature of the existing bridge are outlined in Section 3.6 of the Section 4(f) Evaluation and in the Memorandum of Agreement (Appendix G).

The preferred alternative would require additional right-of-way from Marathon Oil and Wayne County Department of Public Works (vacant lot at the southwest quadrant), Morton Salt (part of the salt storage yard at the southeast quadrant), part of the parking lot on the corner of Oakwood Boulevard and Denmark Avenue, and a small portion from the lot at Fort and Reisener streets. Building on a new alignment south of the existing structure, at a 13° skew, would increase the length of the bridge and the construction cost. The additional construction costs would be offset by less complex construction with minimal or no impact to the existing utility system in brick tunnels beneath the existing bridge. Overall costs for Alternative B would be slightly more than replacing the bridge on its existing alignment. A bridge closure and detour of up to two years would be required for vehicular traffic, as referenced previously for Alternative A. Boat traffic in the channel would be maintained during construction.

Alternative B would satisfy U.S. Coast Guard requirements, improve the Fort Street/Oakwood Boulevard intersection, have minimal impacts to utilities in the tunnel beneath the bridge, and

would allow an opportunity to retain the operator's house. Therefore, Alternative B is the preferred alternative and its potential impacts are addressed in this Environmental Assessment.

1.2.4 Replacement on a 5° Skewed Alignment (Alternative C)

Replacing the bridge on a 5° skew south of the existing bridge, as illustrated in Exhibit 5, would avoid the existing bridge alignment, maintain existing bridge service during construction, and would not require a detour. Alternative C would require a longer bridge span than replacing on the existing alignment (Alternative A) and a shorter span than replacing on a 13° degree skew (Alternative B). Impacts to the utility system in the brick tunnels beneath the existing bridge would be minimal.

Construction costs for replacing the bridge on 5° skew would be slightly more than replacing the structure on its existing alignment. Alternative C would require more right-of-way from Morton Salt than any of the other alternatives and would necessitate the taking of property from potentially historic residential properties on the south side of Fort Street, east of Reisener Street.

The geometrics of a 5° skewed alignment would reduce traffic capacity and jeopardize motorist safety. The alignment would require too sharp a curve in the approach between the bridge and the Fort Street and Miller Road/Reisener intersection and would also require a wider pavement area at the intersection. Additionally, the curves associated with the 5° skewed alignment are inconsistent with the long-term plan to revitalize the Fort Street corridor and provide motorists with a safe and efficient option to I-75. Therefore, the bridge replacement on a 5° skew is not considered a feasible alternative and was dismissed.

1.2.5 Rehabilitation of the Existing Bascule Bridge (Alternative D)

The historic nature of the bridge requires that rehabilitation of the existing structure be considered. Correcting the structural, electrical, and mechanical deficiencies of the bridge would require considerable rehabilitation measures. The inward migration of the piers is one of the most critical deficiencies influencing the feasibility of rehabilitation. The cost to stabilize the existing foundations and substructures from future movement and the level of effort required to repair the deteriorated concrete would be close to the cost to replace them.

To maintain long-term use of the bridge, a complete mechanical rehabilitation of the structure would be necessary. New bridge machinery would last at least 50 years and would meet current AASHTO requirements, which the existing components do not. The active corrosion between the built up sections and the advanced state of deterioration make it prohibitively expensive to restore the existing superstructure. The usual methods of cleaning and coating steel structures will not stop the pack rust that has formed between the members. Disassembly, cleaning, coating, and reassembly of the many pieces in the bridge's superstructure would be time consuming and very labor intensive. It would be more cost efficient to replace the current fender system than to modify and repair the existing pier protection system, which does not meet current standards. In addition, rehabilitating the bridge would not address the inadequacy of horizontal clearance. Because of issues associated with pier migration, structural deterioration and corrosion, and

inadequate horizontal clearance, the rehabilitation alternative is not considered feasible and this alternative was dismissed.

1.2.6 Building on a New Location without Removing the Existing Bridge (Alternative E)

Under this alternative, the existing historic bridge would be retained but be closed to vehicular or all traffic. A new crossing would be developed at an alternate location. This alternative was not considered as there are no feasible or prudent alternate crossing points.

1.2.7 Relocation of the Bridge to a New Site (Alternative F)

The historic bridge would be relocated and reconstructed at a new location, while a new bridge would be constructed on the existing alignment. This alternative would not be feasible or prudent due to the high costs of reconstruction and dismantling, storing and transporting the bridge components; all of this presuming an appropriate location could be identified and secured for relocation.